MSC Software’s Adams 2014 Delivers Higher Fidelity and Ease of Use with Native Nonlinear and Coupled FE Technologies

New release unites multibody dynamics and nonlinear FEA


Efficiently designing and testing mechanical systems is a challenge for some engineers due to lack of smooth integration between system dynamics and finite element analysis (FEA) software domains. The Adams 2014 release addresses this issue by introducing new native nonlinear part modeling and analysis, and co-simulation between Adams and Marc nonlinear finite element analysis. Adams 2014 also extends popular machinery and automotive industry solutions with the new Cam module in Adams/Machinery and extended vehicle modeling and rollover events in Adams/Car.

Highlights of this release include:

- **New Adams Native Nonlinear Part Modeling and Analysis**
  The FE Part is a new Adams-native modeling object for very large deformation use cases, and specifically considers geometric nonlinearity. The formulation options are based on MSC adaptations of the Absolute Nodal Coordinate Formulation (ANCF) and Geometrically Exact Beam Formulation (GEBF). Engineers can more accurately calculate dynamic loads for geometrically nonlinear parts within a multibody dynamic system. The FE Part offers a 3D Beam formulation option, a three-dimensional, fully geometrically nonlinear representation useful for beam-like structures; a basic two-dimensional option is available as well. Adams/View supports the creation, visualization, and modification of FE Parts, as well as the convenient application of distributed loads via the new FE Load. In some benchmark test cases, modeling time was reduced from 8 hours to 30 minutes.

  “The new Adams nonlinear beam implementation is a great feature that makes it much easier to add nonlinear compliance and contact behaviors to the model, without affecting simulation times. Used creatively, the beam element can represent a variety of situations that previously required flex body generation and/or multi-component part representation, saving time and making parameterization easier,” said Joseph Little, Virtual Tools Engineer at Chrysler Group

- **New Full Co-simulation Support for Adams and Marc**
  The Adams-Marc co-simulation capability enables users to perform real co-simulation between Adams and Marc nonlinear FEA software. By doing so, multibody dynamics engineers working with Adams can increase model accuracy by including geometrically and materially nonlinear structural behavior, and FEA engineers can study components with realistic boundary conditions.
The co-simulation delivers dramatic time savings for nonlinear FEA users because some of the rigid moving parts can be simulated in Adams instead of the FEA environment; this drives the total solution time down dramatically.

“The Adams-Marc co-simulation capability more than satisfies our guideline of ‘reasonable results in a reasonable time.’ With up to a 90% reduction in computation time, optimization using advanced nonlinear FEA becomes practical. Such development provides a great benefit and is crucial for our product development,” said Dr. Steve Jia, Chief Engineer, Litens Automotive Group

- **New Cam Module in Adams/Machinery**
  Optimizing cam-follower systems early in the design process is key to saving cost and improving product performance. The new Adams/Machinery Cam module provides easy-to-use modeling of cam-follower systems. These systems may comprise various combinations of cam shapes, follower motions, follower arrangements, and follower geometry. The new feature makes Cam model creation much faster. It is easier to make mechanism motion and Cam profile design changes, and optimize the motion function to minimize or maximize acceleration, for instance.

- **New Vehicle Modeling Enhancements in Adams/Car**
  **New Stability Events in Adams/Car**
  Rollover accidents can cause fatalities. To provide better occupant protection, the study of rollover motion and vehicle stability is crucial. Adams/Car now provides three new rollover stability test events, including Embankment, Corkscrew, and Sand Bed.
  **FTire Animation**
  Higher-fidelity analysis and visualization are needed for vehicle ride events like tires rolling over various surfaces. FTire contact forces and tire deformation forces can now be animated within Adams/PostProcessor.
  **SmartDriver Enhancements**
  Vehicle performance and handling tests continue to evolve, and so does the need to virtually model and simulate these events virtually. To address this challenge, a number of enhancements to SmartDriver have been introduced. Improved backwards driving for open loop events is supported for both simple and automatic powertrains. Other noteworthy features include additional speed profile spline interpolation improvements, providing continuous target acceleration and smoother throttle and brake signals.

For more details about the new release, please watch the on-demand new release webinar at [http://bit.ly/1p00DCn](http://bit.ly/1p00DCn)

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